

Claim Amendments

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

Claims 1-22. (Canceled)

Claim 23. (New) A polyurethane (A) prepared from reactants consisting essentially of:

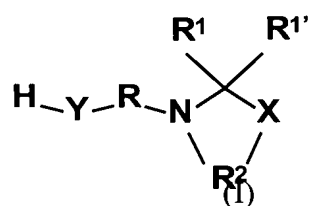
- a) at least one organic diisocyanate or polyisocyanate,
- b) at least one compound comprising at least one isocyanate-reactive group and at least one free radically polymerizable unsaturated group and/or cationically polymerizable group,
- c) at least one compound comprising at least one isocyanate-reactive group and at least one capped amino group and having a molecular weight below 1000 g/mol,
- d) optionally, at least one compound comprising at least one isocyanate-reactive group and at least one actively dispersing group,
- e) optionally, at least one diol compound which is a hydrocarbon diol having from 2 to 20 carbon atoms, and
- f) optionally, compounds other than a) to d) comprising at least one isocyanate-reactive group, said components reacting under such conditions as to form a material that contains an allophanate fraction ranging from 5 to 65 mol % based on the lowest molecular weight allophanate molecule.

Claim 24. (New) The polyurethane (A) according to claim 23, wherein component c) has a molecular weight below 750 g/mol.

Claim 25. (New) The polyurethane according to claim 23, comprising per 100 g of compound at least 0.01 mol of unsaturated free radically or cationically polymerizable groups and/or at least 0.01 mol of capped amino groups.

Claim 26. (New) The polyurethane according to claim 23, wherein the amino group of said at least one capped amino group is selected from the group consisting of open-chain aminals, cyclic aminals, ketimines, aldimines, N,O-acetals, N,O-ketals, carboxamides, sulfonamides, and amidines.

Claim 27. (New) The polyurethane according to claim 23, wherein component c) has the formula (I)



where

R and R² independently are each a divalent organic aliphatic, cycloaliphatic or aromatic radical comprising 2 to 20 carbon atoms which is unsubstituted or substituted by functional groups, aryl, alkyl, aryloxy, alkyloxy, halogen, heteroatoms and/or heterocycles;

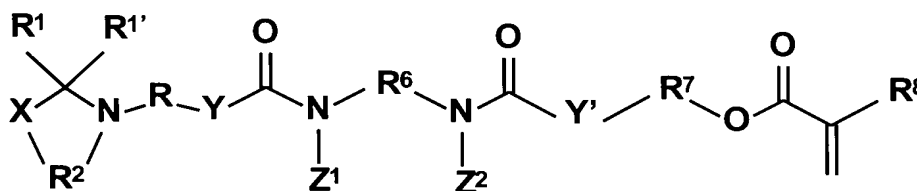
R^1 and $R^{1'}$ independently are each hydrogen, C_1 - C_{18} alkyl, C_2 - C_{18} alkyl which is uninterrupted or interrupted by one or more oxygen and/or sulfur atoms and/or by one or more substituted or unsubstituted imino groups, or is C_6 - C_{12} aryl, C_5 - C_{12} cycloalkyl or a five- or six-membered heterocycle containing oxygen, nitrogen and/or sulfur atoms, and each of said radicals optionally being substituted by functional groups, aryl, alkyl, aryloxy, alkyloxy, halogen, heteroatoms and/or heterocycles;

X is oxygen (-O-), unsubstituted or monosubstituted nitrogen (-N(R^4)-) or $>N-NR^4R^5$;

Y is oxygen (-O-), unsubstituted nitrogen (-N(H)-) or sulfur (-S-); and

R^4 and R^5 independently are each hydrogen or C_1 - C_4 alkyl.

Claim 28. (New) The polyurethane according to claim 23, comprising at least one of the following compounds of formula (II)



wherein

R and R^2 independently are each a divalent organic aliphatic, cycloaliphatic or aromatic radical containing 2 to 20 carbon atoms and unsubstituted or substituted by functional groups, aryl, alkyl, aryloxy, alkyloxy, halogen, heteroatoms and/or heterocycles;

R^1 and $R^{1'}$ independently are each hydrogen, C_1 - C_{18} -alkyl, C_2 - C_{18} -alkyl which is uninterrupted or interrupted by one or more oxygen and/or sulfur atoms and/or by one or more substituted or unsubstituted imino groups, or are each C_6 - C_{12} -aryl, C_5 - C_{12} -cycloalkyl or a five- or six-membered heterocycle containing oxygen, nitrogen and/or sulfur atoms, and

each of said radicals optionally being substituted by functional groups, aryl, alkyl, aryloxy, alkyloxy, halogen, heteroatoms and/or heterocycles;

X is oxygen (-O-), unsubstituted or monosubstituted nitrogen (-N(R⁴)-) or >N-NR⁴R⁵;

Y is oxygen (-O-), unsubstituted nitrogen (-N(H)-) or sulfur;

Y' is the same as or different from Y;

R⁶ and R⁷ each independently are a divalent organic aliphatic, cycloaliphatic or aromatic radical containing 2 to 20 carbon atoms and unsubstituted or substituted by functional groups, aryl, alkyl, aryloxy, alkyloxy, halogen, heteroatoms and/or heterocycles;

R⁸ is hydrogen, methyl, ethyl or hydroxymethyl, and

Z¹ and Z² are identical or different and independently of one another are hydrogen or -(CO)-NH-R⁶-NCO.

Claim 29. (New) The polyurethane according to claim 23, wherein the reactants further comprise a catalyst which catalyzes the allophanate formation reaction and is a quaternary ammonium hydroxide or a quaternary ammonium carboxylate.

Claim 30. (New) The polyurethane according to claim 23, wherein the reactants further comprise an accelerator selected from the group consisting of zinc octoate, tin octoate and dibutyl laurate.

Claim 31. (New) The polyurethane according to claim 23, wherein component (e) is a diol selected from the group consisting of ethylene glycol, 1,2-propanediol, 1,3-propanediol, 1,1-dimethylethane-1,2-diol, 1,6-hexanediol, 1,10-decanediol, bis-(4-hydroxycyclohexane)isopropylidene, tetramethylcyclobutanediol, 1,2-, 1,3- or 1,4-

cyclohexanediol, cyclooctanediol, norbornanediol, pinanediol, decalindiol, bisphenol A, diethylene glycol, triethylene glycol, dipropylene glycol, tripropylene glycol, neopentyl glycol, 1,2- and 1,4-butanediol, 1,5-pentanediol, 2-methyl-1,5-pentanediol, 2-ethyl-1,4-butanediol, 1,2-, 1,3- or 1,4-dimethylolcyclohexane; or is selected from the group consisting of glycerol, trimethylolethane, trimethylolpropane, trimethylolbutane, dipentaerythritol, ditrimethylolpropane, butanetriol, erythritol, pentaerythritol, sorbitol, 2-aminoethanol, 3-amino-1-propanol, 1-amino-2-propanol and 2-(2-aminoethoxy)ethanol.

Claim 32. (New) A polyurethane dispersion, comprising:

(A) a polyurethane according to claim 23 and comprising component d),

(C) optionally, one or more photochemically and/or thermally activatable initiators,

and

(D) optionally, further coatings additives.

Claim 33. (New) A coating composition, comprising:

said polyurethane dispersion according to claim 32, and

(C) optionally, one or more photochemically and/or thermally activatable initiators, and

(D) optionally, further coatings additives.

Claim 34. (New) A method of coating a substrate, which comprises:

radiation curing a substrate coated with said polyurethane as claimed in claim 23, and

heating the applied polyurethane at a temperatures up to 160° C.

Claim 35. (New) The method according to claim 34, wherein said temperature ranges from 60 to 160° C.

Claim 36. (New) The method according to claim 34, wherein the radiation curing is conducted under inert gas.

Claim 37. (New) A radiation-curable coating composition comprising said polyurethane according to claim 23.

Claim 38. (New) A method for coating wood, metal or plastic, said method, comprising:
coating said wood, metal or plastic with said polyurethane according to claim 23.

Claim 39. (New) An automotive paint or automotive topcoat material comprising said polyurethane as claimed in claim 23.

Claim 40. (New) A coating composition, comprising:
said polyurethane (A) according to claim 23 and
(C) optionally, one or more photochemically and/or thermally activatable
initiators, and
(D) optionally, further, additives.

Claim 41. (New) A method for coating wood, metal or plastic, said method, comprising:
coating said wood, metal or plastic with said polyurethane dispersion according to

claim 31.

Claim 42. (New) A polyurethane (A) prepared from reactants consisting essentially of:

- a) at least one organic diisocyanate or polyisocyanate,
- b) at least one compound comprising at least one isocyanate-reactive group and at least one free radically polymerizable unsaturated group and/or cationically polymerizable group,
- c) at least one compound comprising at least one isocyanate-reactive group and at least one capped amino group and having a molecular weight below 1000 g/mol,
- d) 1-30 mol % of at least one compound comprising at least one isocyanate-reactive group and at least one actively dispersing group,
- e) optionally, at least one compound comprising at least two isocyanate-reactive groups which is a hydrocarbon diol having from 2 to 20 carbon atoms, and
- f) optionally, compounds other than a) to d) comprising at least one isocyanate-reactive group, said reaction components reacting under such conditions that form a product that contains an allophanate fraction ranging from 5 to 65 mol % based on the lowest molecular weight allophanate molecule.

Claim 43. (New) The polyurethane according to claim 42, wherein component (e) is a diol selected from the group consisting of ethylene glycol, 1,2-propanediol, 1,3-propanediol, 1,1-dimethylethane-1,2-diol, 1,6-hexanediol, 1,10-decanediol, bis-(4-hydroxycyclohexane)isopropylidene, tetramethylcyclobutanediol, 1,2-, 1,3- or 1,4-cyclohexanediol, cyclooctanediol, norbornanediol, pinanediol, decalindiol, diethylene glycol, triethylene glycol, dipropylene glycol, tripropylene glycol, neopentyl glycol, bisphenol A,

1,2- and 1,4-butanediol, 1,5-pentanediol, 2-methyl-1,5-pentanediol, 2-ethyl-1,4-butanediol, 1,2-, 1,3- or 1,4-dimethylolcyclohexane; or is selected from the group consisting of glycerol, trimethylolethane, trimethylolpropane, trimethylolbutane, butanetriol, pentaerythritol, dipentaerythritol, ditrimethylolpropane, erythritol, sorbitol, 2-aminoethanol, 3-amino-1-propanol, 1-amino-2-propanol and 2-(2-aminoethoxy)ethanol.

Claim 44. (New) A polyurethane (A) prepared from reactants consisting essentially of:

- a) at least one (cyclo)aliphatic organic diisocyanate or polyisocyanate,
- b) at least one compound comprising at least one isocyanate-reactive group and at least one free radically polymerizable unsaturated group and/or cationically polymerizable group selected from the group consisting of monoesters of α,β -unsaturated carboxylic acids, vinyl ethers with diols or polyols having 2 to 20 carbon atoms, esters or amides of (meth)acrylic acid with aminoalcohols, unsaturated polyetherols or polyesterols or polyacrylate polyols having an average OH functionality ranging from 2 to 10,
- c) at least one compound comprising at least one isocyanate-reactive group and at least one capped amino group and having a molecular weight below 1000 g/mol,
- d) optionally, at least one compound comprising at least one isocyanate-reactive group and at least one actively dispersing group, and
- f) optionally, compounds other than a) to d) comprising at least one isocyanate-reactive group, said reaction components reacting under such conditions that form a product that contains an allophanate fraction ranging from 5 to 65 mol % based on the lowest molecular weight allophanate molecule.